TETRA TECH, INC.

TECHNICAL MEMORANDUM

Basewide Groundwater Monitoring Program Report
Winter 2006 (Q1)
Installation Restoration Program Site 20, Area 1
Vandenberg Air Force Base, California

09 June 2006

Prepared by:
Tetra Tech, Inc.
4213 State Street, Suite 100
Santa Barbara, CA 93110

1.0 INTRODUCTION

This report documents the activities and results of the winter 2006 groundwater monitoring at Installation Restoration Program Site 20, Area 1 (Underground Storage Tank [UST] Area), Operable Unit 1, Vandenberg Air Force Base, Santa Barbara County, California. Tetra Tech, Inc. (Tetra Tech) collected groundwater samples at Site 20, Area 1 during February 2006. The location of Site 20 is shown on Figure 1.

The groundwater monitoring is being completed in accordance with the Basewide Groundwater Monitoring Program (BGMP) Work Plan (Tetra Tech 2000a), the BGMP Health and Safety Plan Addendum (Tetra Tech 2000b), the Basewide Sampling and Analysis Plan (Tetra Tech 2003), the BGMP Quality Assurance Project Plan (QAPP) Addendum (Tetra Tech 2004), Vandenberg AFB Hazardous Waste Management Plan (U.S. Air Force 2002), and the Waste Management Plan Addendum (Tetra Tech 2005). Regulatory oversight of the work is being performed by the California Department of Toxic Substances Control (DTSC) and Regional Water Quality Control Board—Central Coast Region (RWQCB).

Site background information is summarized in Section 2.0. The scope of work and methodology for sampling are presented in Section 3.0. The results of the groundwater monitoring are presented in Section 4.0. Quality Assurance/Quality Control (QA/QC) is discussed in Section 5.0. Recommendations for future sampling rounds are presented in Section 6.0.

2.0 BACKGROUND

2.1 SITE DESCRIPTION

Site 20, Area 1 (UST Area) is located in the main cantonment area, on the west side of Utah Avenue (Figure 1). Site 20 also includes Landfill 1 (Area 2) and Drum Disposal Site 1 (Area 3), which are discussed separately in this report due to the differences in hydrogeology, chemicals of concern, and sampling program. Site 20, Area 1 groundwater monitoring is performed semiannually, during winter and summer quarters. Site 20, Areas 2 and 3 is sampled annually, with the exception of well 20-MW-3, which is sampled semiannually, and any surface water that is collected during periods of rainfall.

Area 1 is located in the northern portion of Site 20. Three 10,000-gallon, concrete USTs were removed from Area 1 in 1993. The USTs were used to store diesel fuel from 1942 until 1946 and gasoline from 1951 to 1953. The USTs were apparently not used after 1953. Total petroleum hydrocarbons quantified as both diesel and gasoline; benzene, toluene, ethylbenzene, and xylene (BTEX) compounds; 1,2-dichloroethane (DCA); and 1,2-dibromoethane (EDB) have been detected in groundwater samples from Area 1. A complete description of Area 1 can be found in the draft *Site 20 Underground Storage Tank Site Assessment Report* (Jacobs Engineering Group [JEG] 1997).

In 1998, a source reduction system (SRS) was installed to remove petroleum hydrocarbons from the soil and groundwater near the former UST locations (Montgomery Watson Harza [MWH 2001]). JEG operated this system from August 1998 to June 1999. The system was offline between June 1999 and January 2001; it has been operated by MWH since January 2001. The system consists of a dual-phase extraction system in well 11669-EW-1, which is located between monitoring wells 11669-MW-4 and 11669-MW-5 (Figure 1). The SRS operations were transitioned to Shaw Environmental, Inc. (Shaw) in September 2004. SRS operation ceased on 31 January 2006. Shaw is preparing a work plan to perform in-situ chemical oxidation in the source area (Shaw 2006). Additional information on site activities can be obtained by contacting the 30th Civil Engineer Squadron, Environmental Management Flight, Restoration Office (30 CES/CEVR) or MWH.

2.2 HYDROGEOLOGY

Groundwater levels measured in January 2006, with the extraction system in operation, indicate that groundwater elevations ranged from approximately 407 to 418 feet above mean sea level (msl) (Table 1). During winter 2006, the interpreted direction of groundwater flow at Site 20, Area 1 was to the northeast with an average hydraulic gradient of 0.03 feet per foot. The gradient has been influenced by operation of extraction well 11669-EW-1. The extraction well radius of influence is approximated in the groundwater elevation contour map (Figure 1). Groundwater monitoring well 11669-MW-4, which is upgradient of the extraction well, appears to be outside of this radius of influence. Downslope and downgradient from Storage Road, groundwater has discharged during past quarters to the surface at seeps Area 1-SP-1 and Area 1-SP-2 at approximately 403 feet above msl.

3.0 SCOPE OF WORK

The work performed during winter 2006 at Site 20, Area 1 included measuring groundwater levels, collecting groundwater samples for laboratory analysis, and preparing this report.

3.1 GROUNDWATER MONITORING METHODOLOGY

Six monitoring wells were sampled at Site 20, Area 1 during winter 2006. A MicroPurge pump, Grundfos pumps, and a bailer were used for purging groundwater at wells 11669-MW-2 and 11669-MW-4 through 11669-MW-8. Sampling was conducted in accordance with the documents cited in Section 1.0. Measured groundwater elevations are presented in Table 1, and groundwater contours are illustrated on Figure 1. Purge records are provided in Appendix A.

In general, wells were purged until a minimum of one pump and tubing volume of water (for MicroPurge pumps) or three well volumes of water (for Grundfos pumps and bailers) were removed and water quality parameters had stabilized. Criteria for determining stabilization are three successive measurements of temperature within ±1 degree Celsius, pH within ±0.1, conductivity within ±5 percent, and a turbidity reading of less than 5 nephelometric turbidity units (NTUs). In cases where parameter stability or a turbidity reading of less than 5 NTUs was not obtained, samples were collected after purging a minimum of five pump and tubing volumes of water (for MicroPurge pumps) or five well volumes of water (for Grundfos pumps and bailers).

3.1.1 MicroPurge Groundwater Sampling

MicroPurge sampling was conducted at monitoring well 11669-MW-2. The pumping rate was determined prior to sampling and calibrated to maintain a static water level (i.e., no drawdown). This well was sampled after purging a minimum of five pump and tubing volumes of water due to unstable conductivity readings.

3.1.2 Standard Groundwater Sampling

A 2-inch Grundfos pump was used for purging groundwater at monitoring wells 11669-MW-4 and 11669-MW-6 through 11669-MW-8. Well 11669-MW-5 was purged using a disposable Teflon bailer. All of these wells were purged dry and sampled after sufficient recharge using a disposable Teflon bailer.

4.0 RESULTS

Temperature, conductivity, pH, and turbidity were measured in the field during purging. These measurements are presented in Appendix A. Readings taken immediately prior to sampling are presented

in Table 2. Fixed laboratory analyses were performed by EMAX Laboratories, Inc. in Torrance, California. Samples were analyzed according to the BGMP Work Plan (Tetra Tech 2000a) for total petroleum hydrocarbons as gasoline (TPHg) and total petroleum hydrocarbons as diesel (TPHd) by U.S. Environmental Protection Agency (EPA) method SW8015B and for volatile organic compounds (VOCs) by EPA method SW8260B. Laboratory analyses and data validation were conducted according to the BGMP QAPP Addendum (Tetra Tech 2004). Data validation was performed on 100 percent of the analytical data. Analytical results are presented in Tables 3 and 4 and on Figure 2. Historical data for key contaminants of concern are presented in Table 5 and on Figures 3A and 3B. Figure 3A contains historical data for key COCs from October 1998 through fall 2003, and Figure 3B contains historical data for key COCs from winter 2004 to present. Chain-of-custody records are provided in Appendix B.

4.1 TOTAL PETROLEUM HYDROCARBONS

Groundwater samples collected from the six wells sampled at Site 20, Area 1 were analyzed for TPHg. TPHg were detected in groundwater from wells 11669-MW-4 and 11669-MW-5, at concentrations of 0.23 and 0.45 milligrams per liter (mg/L) (0.45 mg/L in the duplicate sample), respectively (Table 3). The TPHg concentration in groundwater from well 11669-MW-4 were within the historical range for that well (Table 5). The TPHg concentrations in groundwater from well 11669-MW-5 have generally been decreasing since October 1998.

Groundwater samples collected from wells 11669-MW-2, 11669-MW-5, and 11669-MW-6 were analyzed for TPHd. TPHd were detected in groundwater from well 11669-MW-5 at a concentration of 0.13 mg/L in both the parent and duplicate samples, which is within the historic range for this well.

4.2 VOLATILE ORGANIC COMPOUNDS

Groundwater samples collected from the six wells sampled at Site 20, Area 1 were analyzed for VOCs. VOCs were detected in groundwater from five of these wells (Table 4). No VOCs were detected in groundwater from well 11669-MW-7.

Benzene was detected above the primary maximum contaminant level (MCL) of 1 microgram per liter (µg/L) in groundwater from wells 11669-MW-4 and 11669-MW-5 at concentrations of 4.3 and 47 µg/L (48 µg/L in the duplicate sample), respectively. The compound 1,2-dichloroethane (1,2-DCA) was detected above the primary MCL of 0.5 µg/L in groundwater from wells 11669-MW-2 and 11669-MW-5, at concentrations of 7.9 and 20 µg/L (in both parent and duplicate samples), respectively.

The benzene concentration detected in groundwater from well 11669-MW-4 was within the historical range for that well (Table 5). Benzene concentrations in groundwater from well 11669-MW-5 have generally been decreasing since October 1998. Concentrations of 1,2-DCA in groundwater from well 11669-MW-2 have been generally decreasing since winter 2002. Concentrations of 1,2-DCA in groundwater from well 11669-MW-5 have been decreasing since summer 2000.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

All of the analytical data presented in this report were validated according to the QAPP Addendum (Tetra Tech 2004). The data validation process included a review of sample preservation, temperature, and hold times; detection and quantitation limits; instrument calibration; and equipment blank, trip blank, method blank, laboratory control sample, and matrix spike/matrix spike duplicate. Data validation qualifiers and comments are provided on the data tables to indicate the results of the data validation and to quantitatively indicate the usability of the data. In addition, field sampling records are reviewed to assess the potential for any field conditions to adversely impact the data quality.

There were no significant quality assurance/quality control discrepancies with the data presented in this report. The data quality objectives for the winter 2006 sampling at Site 20, Area 1 were achieved.

6.0 RECOMMENDATIONS

One recommendation for the winter 2006 Groundwater Monitoring Report is presented below:

1. Tetra Tech and the Air Force recommend reducing the sampling frequency for TPHd and TPHg at well 11669-MW-6 from semiannually to annually during winter sampling events. TPHd and TPHg have not been detected in groundwater from this well during the last four sampling events. The other wells that are sampled annually are sampled during winter sampling events. Figure 1 indicates the influence of the extraction system on the nearby potentiometric surface causes a groundwater flow pattern away from well 11669-MW-6 and toward well 11669-MW-2.

This recommendation was developed in accordance with the Air Force Center for Environmental Excellence Long-Term Monitoring Optimization Guide (U.S. Air Force 1997) and the decision tree developed by Tetra Tech for the BGMP at Vandenberg AFB (Tetra Tech 2002).

The summer 2006 sampling will be conducted according to the work plan (Tetra Tech 2000a).

7.0 REFERENCES

Jacobs Engineering Group, Inc. (JEG)

1997 *Site 20 Underground Storage Tank Assessment Report.* September.

Montgomery Watson Harza (MWH)

2001 *Performance Monitoring Report, Site 20 Source Reduction System.* Vandenberg Air Force Base, California. October.

Shaw Environmental, Inc. (Shaw)

2006 Vandenberg AFB Installation Restoration Program RPM Meeting Slides. 22 February 2006.

Tetra Tech, Inc.

2000a *Basewide Groundwater Monitoring Program Work Plan.* Prepared for 30 CES/CEV, Installation Restoration Program, Vandenberg Air Force Base, California, and Headquarters Air Force Space Command, Peterson Air Force Base, Colorado. December.

Tetra Tech, Inc.

2000b *Basewide Groundwater Monitoring Program Health and Safety Plan Addendum.* Prepared for 30 CES/CEV, Installation Restoration Program, Vandenberg Air Force Base, California, and Headquarters Air Force Space Command, Peterson Air Force Base, Colorado. December.

Tetra Tech, Inc.

2002 *Basewide Groundwater Monitoring Program Interpretation, Visualization, and Optimization, Vandenberg Air Force Base Installation Restoration Program.* Presentation prepared for 30 CES/CEVR Installation Restoration Program, Vandenberg Air Force Base, California. March.

Tetra Tech, Inc.

2003 *Basewide Sampling and Analysis Plan. Final.* Prepared for 30 CES/CEV Installation Restoration Program, Vandenberg Air Force Base, California, and Headquarters Air Force Space Command, Peterson Air Force Base, Colorado. September.

Tetra Tech, Inc.

2004 *Basewide Groundwater Monitoring Program Quality Assurance Project Plan Addendum. Final.* Prepared for Department of the Air Force 30 CES/CEVR, 806 13th Street, Suite 116, Vandenberg Air Force Base, California, and Department of the Air Force, Air Force Center for Environmental Excellence, DERA Restoration Division, 3300 Sidney Brooks, Brooks City-Base, Texas. July.

Tetra Tech, Inc.

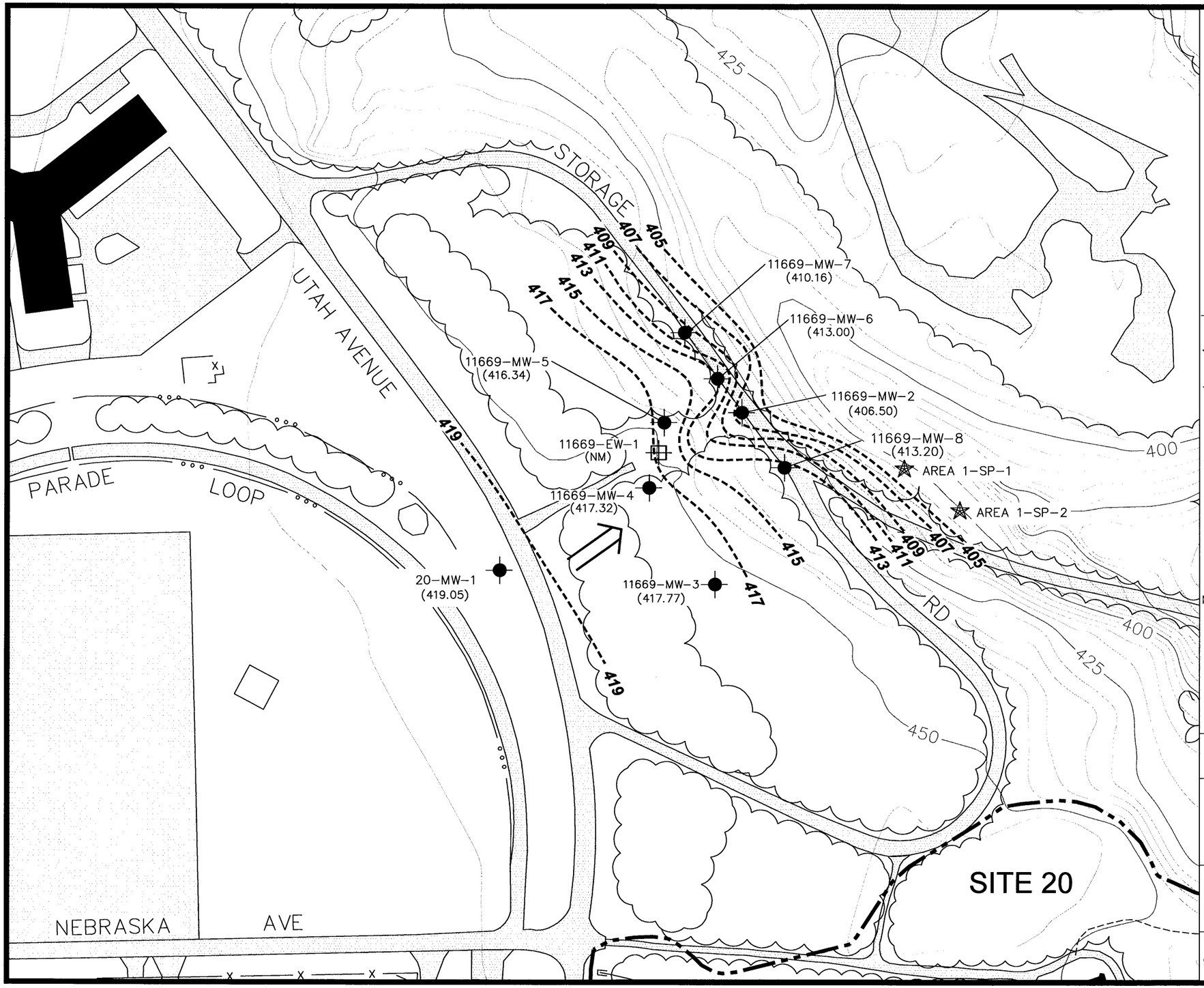
2005 *Waste Management Plan Addendum. Final.* 730 CES/CEVR, IRP, Vandenberg Air Force Base, California, and Headquarters Air Force Space Command, Peterson Air Force Base, Colorado. February.

U.S. Air Force

1997 *Long-Term Monitoring Optimization Guide, Final, Version 1.1.* Headquarters Air Force Center for Environmental Excellence, Brooks Air Force Base, Texas. October.

U.S. Air Force

2002 Headquarters Thirtieth Space Wing, Vandenberg AFB, California. *Hazardous Waste Management Plan, 30 SW Plan 32-7043-A, Change 1.* HQ 30th Space Wing, Vandenberg Air Force Base, California 93437-6261. April.



LEGEND

- CONTOUR LINE, 5–FOOT INTERVALS (FEET ABOVE MSL, NAVD 1988)
- RAILROAD
- FENCE
- PAVED ROAD OR STREET
- DIRT ROAD
- BUILDING
- CONCRETE OR PAVED AREAS
- VEGETATION LINE
- DRAINAGE ROUTE
- SITE BOUNDARY
- 11669–MW–2 (406.50) GROUNDWATER MONITORING WELL WITH GROUNDWATER ELEVATION
- AREA 1–SP–1 SEEP SAMPLING LOCATION
- 11669–EW–1 LOCATION OF EXTRACTION WELL
- INFERRED GROUNDWATER FLOW DIRECTION
- 417 — 417 GROUNDWATER ELEVATION CONTOUR APPROXIMATED BY LINEAR INTERPOLATION (DASHED WHERE INFERRED); POTENTIOMETRIC SURFACE INFLUENCED BY EXTRACTION WELL 11669–EW–1.
- NM WATER LEVEL NOT MEASURED

NOTE(S): GROUNDWATER ELEVATIONS ARE IN FEET ABOVE MSL AS MEASURED IN JANUARY 2006.

N

0 75' 150' 225'

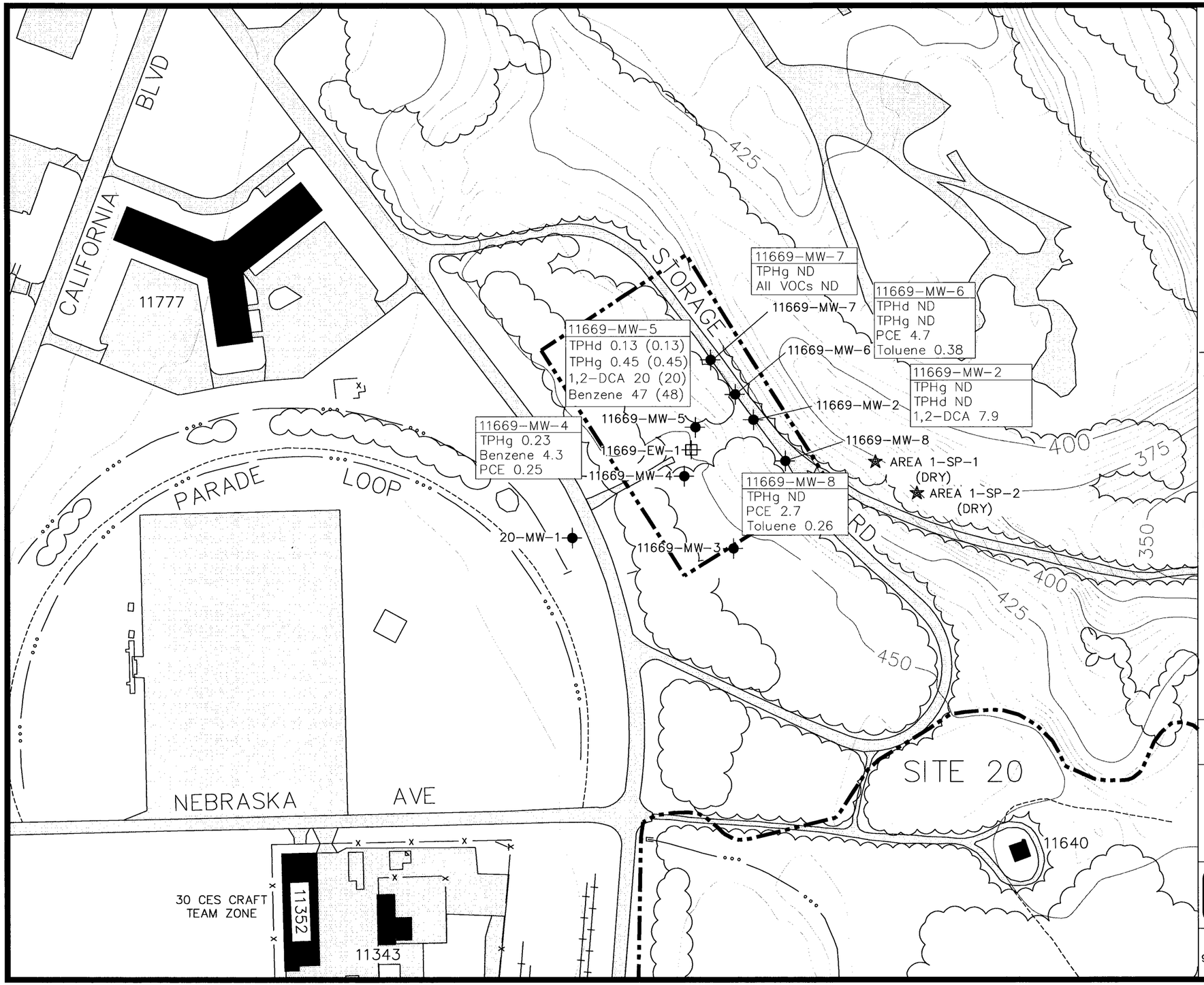
SCALE

UNITED STATES AIR FORCE
VANDENBERG AIR FORCE BASE

SITE 20
AREA 1 (UST AREA) SITE PLAN
AND GROUNDWATER CONTOURS
WINTER 2006

TETRA TECH, INC.
4213 State Street, Suite 100
Santa Barbara, CA 93110-2847

TASK NO.	DATE	DRAWN BY	MADE FROM	DWG NO.	Figure
99105–18	4/3/06	PRICHARD	TAB21	5539	1



LEGEND

- 425 — CONTOUR LINE, 5-FOOT INTERVALS (FEET ABOVE MSL, NAVD 1988)
- RAILROAD
- x FENCE
- PAVED ROAD OR STREET
- DIRT ROAD
- 1788 BUILDING
- CONCRETE OR PAVED AREAS
- VEGETATION LINE
- DRAINAGE ROUTE
- SITE BOUNDARY
- 11669-MW-2 GROUNDWATER MONITORING WELL
- AREA 1-SP-1 SEEP SAMPLING LOCATION
- 11669-EW-1 LOCATION OF EXTRACTION WELL
- ND NOT DETECTED; RESULT IS LESS THAN THE METHOD DETECTION LIMIT

NOTE(S): RESULTS FOR ALL COMPOUNDS EXCEPT TPHg AND TPHd ARE IN µg/L. TPHg AND TPHd RESULTS ARE IN mg/L. RESULTS IN PARENTHESES ARE FROM DUPLICATE SAMPLES.

N

0 100' 200' 300'
SCALE

UNITED STATES AIR FORCE
VANDENBERG AIR FORCE BASE

SITE 20 AREA 1 (UST AREA) ANALYTICAL RESULTS WINTER 2006

TETRA TECH, INC.
4213 State Street, Suite 100
Santa Barbara, CA 93110-2847

TASK NO.	DATE	DRAWN BY	MADE FROM	DWG NO.	Figure
99105-18	4/14/06	PRICHARD	TAB21	5576	2

11669-MW-5	EDB	Benzene	Ethylbenzene	Toluene	m,p-Xylenes	o-Xylene	TPHg	TPHd	1,2-DCA	1,2-DCP
Oct-98	125	4,520	270	1,350	814	279	12.1	ND	490	ND
Feb-99	ND	2,980	126	165	320	79	8.06	ND	347	ND
Jun-99	ND	1,300	39	170	320	110	5.29	0.94	180	ND
Sept-99	19	1,300	28	270	420	ND	5.37	NA	200	ND
Sum-00	39	2,400	72	400	580	110	5.1	NA	360	36
Win-01	29	1,800	38	120	300	78	7.5	NA	180	27
Sum-01	13	1,200	12	6.2	100	29	3.4	NA	ND	24
Win-02	3.4	510	ND	ND	ND	ND	2.6	NA	65	12.0
Sum-02	ND	150	ND	0.68	8.9	1.3	1.2	NA	ND	5.9
Win-03	ND	200	ND	0.66	5.8	1.2	1.2	NA	ND	ND
Sum-03	ND	220	ND	ND	15	3.3	1.32	NA	43	7.1

11669-MW-7	TPHg
Oct-98	0.0282
Feb-99	ND
Sept-99	ND
Sum-00	ND
Win-01	ND
Sum-01	ND
Win-02	ND
Sum-02	ND
Sum-03	ND

11669-MW-6	TPHg
Oct-98	ND
Feb-99	ND
Sept-99	ND
Sum-00	ND
Win-01	ND
Sum-01	ND
Win-02	ND
Sum-02	ND
Win-03	ND
Sum-03	ND

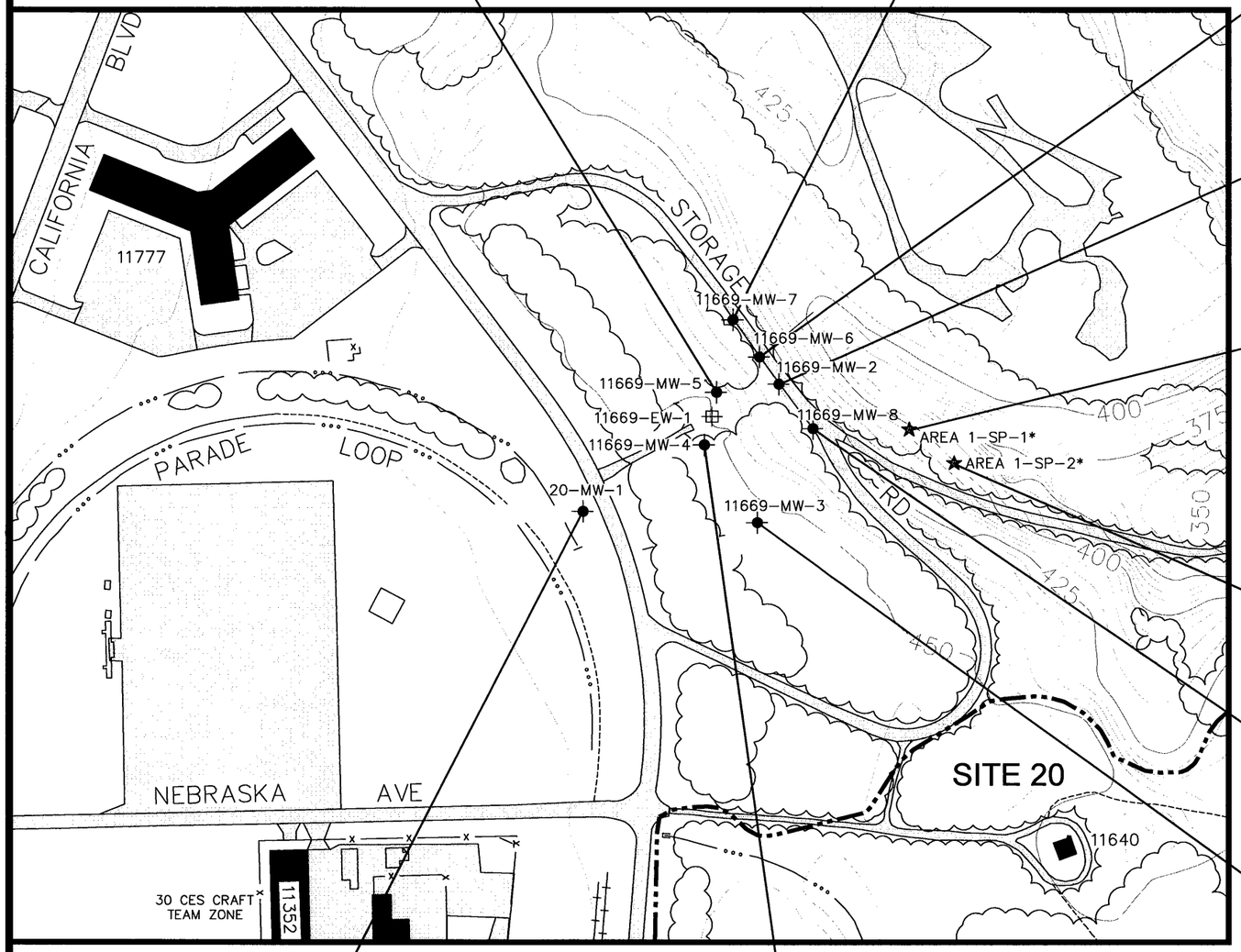
11669-MW-2	1,2-DCA	1,2-DCP
Oct-98	6.3	ND
Feb-99	6.83	ND
Jun-99	11	ND
Sept-99	10	ND
Sum-00	13	ND
Win-01	19	ND
Sum-01	22	0.87
Win-02	27	0.91
Sum-02	21	0.71
Win-03	20	ND
Sum-03	13	0.36

Area1-SP-1	TPHg
Win-01	ND
Win-02	ND
Sum-02	DRY
Win-03	ND
Sum-03	DRY

Area1-SP-2	TPHg
Win-01	ND
Sum-01	ND
Win-02	ND
Sum-02	ND
Win-03	ND
Sum-03	DRY

11669-MW-8	TPHg
Oct-98	ND
Feb-99	0.0231
Jun-99	ND
Sept-99	ND
Sum-00	ND
Win-01	ND
Sum-01	ND
Win-02	ND
Sum-02	ND
Win-03	ND
Sum-03	ND

11669-MW-3	Toluene	TPHg
Oct-98	ND	0.0379
Feb-99	0.39	ND
Jun-99	ND	ND
Sept-99	0.26	ND
Sum-00	ND	ND
Win-01	ND	ND
Sum-01	ND	ND
Win-02	ND	ND
Win-03	ND	ND



20-MW-1	Benzene	Ethylbenzene	Toluene	m,p-Xylenes	o-Xylene
Oct-98	ND	0.292	0.265	1.68	0.864
Feb-99	ND	ND	ND	ND	ND
Jun-99	0.23	ND	ND	ND	ND
Sept-99	ND	ND	ND	ND	ND
Sum-00	ND	ND	ND	ND	ND
Win-01	ND	ND	ND	ND	ND
Sum-01	ND	ND	ND	ND	ND
Win-02	ND	ND	ND	ND	ND
Win-03	ND	ND	ND	ND	ND

11669-MW-4	Benzene	Ethylbenzene	Toluene	m,p-Xylenes	o-Xylene	TPHg	1,2-DCA
Oct-98	ND	ND	ND	ND	ND	ND	ND
Feb-99	1.05	ND	ND	0.655	ND	0.212	ND
Jun-99	ND	ND	ND	ND	ND	0.104	ND
Sept-99	ND	ND	ND	ND	ND	0.021	1.1
Sum-00	1.4	ND	ND	ND	ND	0.4	ND
Win-01	1.4	ND	ND	ND	ND	0.64	ND
Sum-01	0.90	ND	ND	ND	ND	0.42	ND
Win-02	2.8	ND	ND	ND	ND	0.44	1.3
Sum-02	4.4	0.53	0.63	1.3	ND	0.59	ND
Win-03	4.2	0.55	0.75	1.5	ND	0.07a	ND
Sum-03	0.72	ND	ND	ND	ND	0.07a	0.25

LEGEND

- 425 — CONTOUR LINE, 5-FOOT INTERVALS (FEET ABOVE MSL, NGVD 1988)
- RAILROAD
- x — FENCE
- PAVED ROAD OR STREET
- DIRT ROAD
- 11352 — BUILDING
- CONCRETE OR PAVED AREAS
- VEGETATION LINE
- UNLINED DRAINAGE ROUTE AND FLOW DIRECTION
- SITE BOUNDARY
- 20-MW-1 — GROUNDWATER MONITORING WELL
- 11669-EW-1 — EXTRACTION WELL
- AREA1 1-SP-1 — SURFACE SEEP LOCATION
- a — RESULT WAS QUALIFIED FOR BLANK CONTAMINATION (B-QUALIFIED) AND IS SUSPECTED TO BE FALSE POSITIVE
- DRY — WELL WAS DRY OR HAD INSUFFICIENT WATER FOR SAMPLING

NOTE(S): ALL RESULTS ARE IN µg/L EXCEPT TPHg AND TPHd RESULTS. TPHg AND TPHd RESULTS ARE IN mg/L.

N

0 125' 250' 375'
SCALE

UNITED STATES AIR FORCE
VANDENBERG AIR FORCE BASE

SITE 20 AREA 1 (UST AREA) HISTORICAL ANALYTICAL RESULTS OF KEY CONTAMINANTS OF CONCERN OCTOBER 1998 THROUGH FALL 2003

TETRA TECH, INC.
4213 State Street, Suite 100
Santa Barbara, CA 93110-2847

TASK NO.	DATE	DRAWN BY	MADE FROM	DWG NO.	Figure
99105-18	6/2/06	PRICHARD	TAB21	5259	3A

11669–MW–7	TPHg
Win–04	0.03[a]
Sum–04	ND
Win–05	ND
Win–06	ND

11669–MW–5	EDB	Benzene	Ethylbenzene	Toluene	m,p–Xylenes	o–Xylene	TPHg	TPHd	1,2–DCA	1,2–DCP
Win–04	1.04	300	ND	0.66	7.09	2.29	0.95	0.26	39.5	ND
Sum–04	0.54	91	ND	0.31	1.8	0.85	0.55	ND	28	3.7
Win–05	ND	64	ND	ND	ND	ND	0.42	ND	26	ND
Sum–05	ND	56	ND	ND	ND	ND	0.43	0.11	20	ND
Win–06	ND	48	ND	ND	ND	ND	0.45	0.13	20	ND

11669–MW–6	TPHg
Win–04	0.03[a]
Sum–04	ND
Win–05	ND
Sum–05	ND
Win–06	ND

11669–MW–2	1,2–DCA	1,2–DCP
Win–04	15.4	0.35
Sum–04	11	0.25
Win–05	9.9	0.22
Sum–05	8.4	ND
Win–06	7.9	ND

Area1–SP–1	TPHg
Win–04	0.03[a]
Sum–04	ND
Win–05	ND

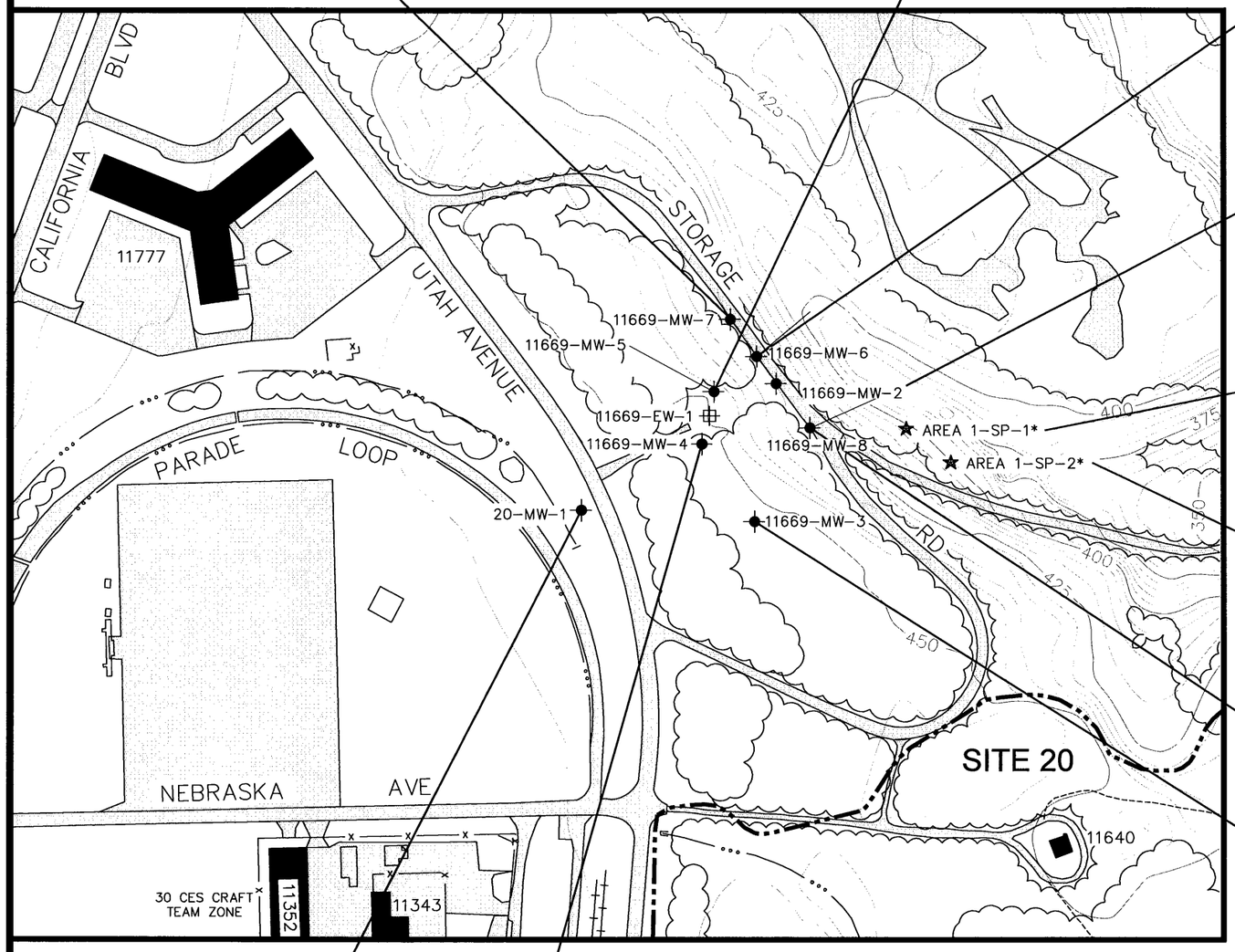
Area1–SP–2	TPHg
Win–04	0.03[a]
Sum–04	ND
Win–05	ND

11669–MW–8	TPHg
Win–04	0.03[a]
Sum–04	ND
Win–05	ND
Win–06	ND

11669–MW–3	Toluene	TPHg
Win–04	ND	0.03[a]

20–MW–1	Benzene	Ethylbenzene	Toluene	m,p–Xylenes	o–Xylene
Win–04	ND	ND	ND	ND	ND

11669–MW–4	Benzene	Ethylbenzene	Toluene	m,p–Xylenes	o–Xylene	TPHg	1,2–DCA
Win–04	5.93	0.37	0.66	1.56	ND	0.62	1.74
Sum–04	4.9	ND	0.35	1.1	0.23	0.27	1.5
Win–05	3.7	ND	ND	0.59	ND	0.26	ND
Sum–05	0.88	ND	ND	ND	ND	0.049	ND
Win–06	4.3	ND	ND	ND	ND	0.23	ND



LEGEND

- CONTOUR LINE, 5–FOOT INTERVALS (FEET ABOVE MSL, NGVD 1988)
- RAILROAD
- FENCE
- PAVED ROAD OR STREET
- DIRT ROAD
- BUILDING
- CONCRETE OR PAVED AREAS
- VEGETATION LINE
- UNLINED DRAINAGE ROUTE AND FLOW DIRECTION
- SITE BOUNDARY
- 20–MW–1 GROUNDWATER MONITORING WELL
- 11669–EW–1 EXTRACTION WELL
- AREA1 1–SP–1 SURFACE SEEP LOCATION

ND NOT DETECTED; RESULT WAS LESS THAN THE METHOD DETECTION LIMIT

a RESULT WAS QUALIFIED FOR BLANK CONTAMINATION (B–QUALIFIED) AND IS SUSPECTED TO BE FALSE POSITIVE

NOTES: RESULTS FOR ALL COMPOUNDS EXCEPT TPHg AND TPHd ARE IN µg/L. TPHg AND TPHd RESULTS ARE IN mg/L.

N

0 125' 250' 375'
SCALE

UNITED STATES AIR FORCE
VANDENBERG AIR FORCE BASE

SITE 20 AREA 1 (UST AREA) HISTORICAL ANALYTICAL RESULTS OF KEY CONTAMINANTS OF CONCERN WINTER 2004 THROUGH WINTER 2006

TETRA TECH, INC.
4213 State Street, Suite 100
Santa Barbara, CA 93110–2847

TASK NO.	DATE	DRAWN BY	MADE FROM	DWG NO.	Figure
99105–18	4/14/06	PRICHARD	TAB21	5577	3B

Table 1
Groundwater Elevations
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

Monitoring Well	Top of Casing Elevation (feet above msl)	Date Measured	Groundwater Depth (feet below TOC)	Groundwater Elevation (feet above msl)			
		Winter 2006	Winter 2006	Winter 2006	Summer 2005	Winter 2005	Summer 2004
20-MW-1	459.01	30-Jan-06	39.96	419.05	419.35	418.91	419.23
11669-EW-1	451.27	NM	NM	NM	NM	NM	NM
11669-MW-2	430.73	30-Jan-06	24.23	406.50	406.25	406.16	406.56
11669-MW-3	456.02	30-Jan-06	38.25	417.77	NM	NM	NM
11669-MW-4	453.40	30-Jan-06	36.08	417.32	417.50	417.30	417.48
11669-MW-5	445.94	30-Jan-06	29.60	416.34	416.56	416.42	416.55
11669-MW-6	430.98	30-Jan-06	17.98	413.00	415.25	413.06	413.20
11669-MW-7	433.18	30-Jan-06	23.02	410.16	410.22	410.59	410.27
11669-MW-8	430.01	30-Jan-06	16.81	413.20	413.27	413.43	413.19

Definition(s):

msl - mean sea level
NM - not measured
TOC - top of well casing

Table 2
Water Quality Parameters
Winter 2006
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

Sampling Location	11669-MW-2	11669-MW-4	11669-MW-5	11669-MW-6	11669-MW-7	11669-MW-8
Sample ID	V11669MW2	V11669MW4	V11669MW5	V11669MW6M	V11669MW7	V11669MW8
Collection Date	7-Feb-06	7-Feb-06	7-Feb-06	6-Feb-06	6-Feb-06	6-Feb-06
Field Parameters[1]:						
Temperature (° Celsius)	16.06	18.62	16.34	17.60	17.38	18.06
Conductivity (µmhos/cm)	1,675	8,230	3,062	1,747	2,083	1,641
pH	5.32	5.57	6.12	5.52	5.31	5.45
Turbidity (NTUs)	0.37	3.44	6.06	3.12	>200	7.95

Definition(s):

µmhos/cm - micromhos per centimeter
NTU - nephelometric turbidity unit

Note(s):

1 - Field parameters measured immediately prior to sampling.

Table 3
TPH in Groundwater
Winter 2006
EPA Method SW8015B (mg/L)
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

Sample Location	Sample ID	Collection Date	TPH as Gasoline			TPH as Diesel		
		MDL[1]	0.02			0.19		
		PQL[1]	0.1			1.0		
11669-MW-2	V11669MW2	7-Feb-06	0.02	U	g	0.098	UJ	b
11669-MW-4	V11669MW4	7-Feb-06	0.23		g	NA		
11669-MW-5	V11669MW5	7-Feb-06	0.45		g	0.13	J	q
11669-MW-5	V99W606 (D)	7-Feb-06	0.45		g	0.13	J	q
11669-MW-6	V11669MW6M	6-Feb-06	0.02	U	g	0.1	UJ	b
11669-MW-7	V11669MW7	6-Feb-06	0.02	U	g	NA		
11669-MW-8	V11669MW8	6-Feb-06	0.02	U	g	NA		

Data Validity Qualifier(s):

J - The analyte was positively identified and the result is usable; however, the analyte concentration is an estimated value.
U - The analyte was not detected at or above the MDL.
UJ - The analyte was not detected above the MDL; however, the MDL is uncertain and may be elevated above normal levels.

Data Validity Comment(s):

b - The surrogate spike recovery was outside quality control criteria.
g - The data met prescribed criteria as detailed in the QAPP.
q - The analyte detection was below the PQL.

Definition(s):

(D) - duplicate sample
MDL - method detection limit
mg/L - milligrams per liter
NA - not analyzed
PQL - practical quantitation limit
QAPP - Quality Assurance Project Plan
TPH - total petroleum hydrocarbons

Note(s):

1 - Values from QAPP Addendum (Tetra Tech 2004).

Table 4
VOCs in Groundwater
Winter 2006
EPA Method SW8260B (µg/L)
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

Sample Location				11669-MW-2	11669-MW-4	11669-MW-5	11669-MW-5	11669-MW-6	11669-MW-7	11669-MW-8
Sample ID				V11669MW2	V11669MW4	V11669MW5	V99W606 (D)	V11669MW6M	V11669MW7	V11669MW8
Collection Date				07-Feb-06	07-Feb-06	07-Feb-06	07-Feb-06	06-Feb-06	06-Feb-06	06-Feb-06
	MDL[a]	PQL[a]	Primary MCL							
1,2-DCA	0.06	1.0	0.5	**7.9** g	0.2 U g	**20** g	**20** g	0.2 U g	0.2 U g	0.2 U g
Benzene	0.07	0.4	1	0.2 U g	**4.3** g	**47** g	**48** g	0.2 U g	0.2 U g	0.2 U g
PCE	0.15	1.0	5	0.2 U g	0.25 J q	0.2 U g	0.2 U g	4.7 g	0.2 U g	2.7 g
Toluene	0.11	1.0	150	0.2 U g	0.2 U g	0.2 U g	0.2 U g	0.38 J q	0.2 U g	0.26 J q
All other analytes	N/A	N/A	N/A	ND	ND	ND	ND	ND	ND	ND

Data Validity Qualifier(s):

J - The analyte was positively identified and the result is usable; however, the analyte concentration is an estimated value.

U - The analyte was not detected at or above the MDL.

Data Validity Comment(s):

g - The data met prescribed criteria as detailed in the QAPP.

q - The analyte detection was below the PQL.

Definition(s):

(D) - duplicate sample

DCA - dichloroethane

MCL - maximum contaminant level

MDL - method detection limit

µg/L - micrograms per liter

N/A - not applicable

ND - Not detected; result is less than the MDL.

PCE - tetrachloroethene

PQL - practical quantitation limit

QAPP - Quality Assurance Project Plan

Note(s):

Bold type indicates results that were above the MCL.

a - Values from QAPP Addendum (U.S. Air Force 2004).

Table 5
Summary of Key Contaminants of Concern
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

Benzene (µg/L)[a]

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	ND	ND	0.23	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-3	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-4	ND	**1.05**	ND	ND	**1.4**	**1.4**	0.90	**2.8**	**4.2**	**4.2**	0.72	**5.93**	**4.9**	**3.7**	0.88	**4.3**
11669-MW-5	**4,520**	**2,980**	**1,300**	**1,300**	**2,400**	**1,800**	**1,200**	**510**	**200**	**200**	**220**	**300**	**91**	**64**	**56**	**48**
11669-MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND
11669-MW-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
Area1-SP-1	NA	NA	NA	NA	NA	ND	NA	ND	DRY	ND	DRY	ND	ND	ND	NA	DRY
Area1-SP-2	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	DRY	ND	ND	ND	NA	DRY

Toluene (µg/L)[b]

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	0.265	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-3	ND	0.39	ND	0.26	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-4	ND	ND	ND	ND	ND	ND	ND	ND	0.63	0.75	ND	0.66	0.35	ND	ND	ND
11669-MW-5	**1,350**	**165**	**170**	**270**	**400**	120	6.2	ND	0.68	0.66	ND	0.66	0.31	ND	ND	ND
11669-MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.38
11669-MW-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND
11669-MW-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.26
Area1-SP-1	NA	NA	NA	NA	NA	ND	NA	ND	DRY	ND	DRY	ND	ND	ND	NA	DRY
Area1-SP-2	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	DRY	ND	ND	ND	NA	DRY

Table 5
Summary of Key Contaminants of Concern
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

Ethylbenzene (µg/L)[c]

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	0.292	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-3	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	0.15	NA	NA	NA	NA
11669-MW-4	ND	ND	ND	ND	ND	ND	ND	ND	0.53	0.55	ND	0.37	ND	ND	ND	ND
11669-MW-5	270	126	39	28	72	38	12	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND
11669-MW-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
Area1-SP-1	NA	NA	NA	NA	NA	ND	NA	ND	DRY	ND	DRY	ND	ND	ND	NA	DRY
Area1-SP-2	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	DRY	ND	ND	ND	NA	DRY

EDB (µg/L)[d]

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-3	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-5	**125**	ND	ND	**19**	**39**	**29**	**13**	**3.4**	ND	ND	ND	**1.04**	**0.54**	ND	ND	ND
11669-MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND
11669-MW-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
Area1-SP-1	NA	NA	NA	NA	NA	ND	NA	ND	DRY	ND	DRY	ND	ND	ND	NA	DRY
Area1-SP-2	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	DRY	ND	ND	ND	NA	DRY

Table 5
Summary of Key Contaminants of Concern
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

m,p-Xylene (µg/L)[e]

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	1.68	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-3	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-4	ND	0.655	ND	ND	ND	ND	ND	ND	1.3	1.5	ND	1.56	1.1	0.59	ND	ND
11669-MW-5	814	320	320	420	580	300	100	ND	8.9	5.8	15	7.09	1.8	ND	ND	ND
11669-MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND
11669-MW-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
Area1-SP-1	NA	NA	NA	NA	NA	ND	NA	ND	DRY	ND	DRY	ND	ND	ND	NA	DRY
Area1-SP-2	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	DRY	ND	ND	ND	NA	DRY

o-Xylene (µg/L)[e]

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	0.864	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-3	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.23	ND	ND	ND
11669-MW-5	279	79	110	ND	110	78	29	ND	1.3	1.2	3.3	2.29	0.85	ND	ND	ND
11669-MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND
11669-MW-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
Area1-SP-1	NA	NA	NA	NA	NA	ND	NA	ND	DRY	ND	DRY	ND	ND	ND	NA	DRY
Area1-SP-2	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	DRY	ND	ND	ND	NA	DRY

Table 5
Summary of Key Contaminants of Concern
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

1,2-DCP (µg/L)[f]

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-2	ND	ND	ND	ND	ND	ND	0.87	0.91	0.71	ND	0.36	0.35	0.25	0.22	ND	ND
11669-MW-3	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-5	ND	ND	ND	ND	**36**	**27**	**24**	**12.0**	**5.9**	ND	**7.1**	ND	3.7	ND	ND	ND
11669-MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND
11669-MW-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
Area1-SP-1	NA	NA	NA	NA	NA	ND	NA	ND	DRY	ND	DRY	ND	ND	ND	NA	DRY
Area1-SP-2	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	DRY	ND	ND	ND	NA	DRY

1,2-DCA (µg/L)[g]

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-2	**6.3**	**6.83**	**11**	**10**	**13**	**19**	**22**	**27**	**21**	**20**	**13**	**15.4**	**11**	**9.9**	**8.4**	**7.9**
11669-MW-3	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND	NA	NA	NA	NA
11669-MW-4	ND	ND	ND	**1.1**	ND	ND	ND	**1.3**	ND	ND	0.25	**1.74**	**1.5**	ND	ND	ND
11669-MW-5	**490**	**347**	**180**	**200**	**360**	**180**	ND	**65**	ND	ND	**43**	**39.5**	**28**	**26**	**20**	**20**
11669-MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11669-MW-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND
11669-MW-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
Area1-SP-1	NA	NA	NA	NA	NA	ND	NA	ND	DRY	ND	DRY	ND	ND	ND	NA	DRY
Area1-SP-2	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	DRY	ND	ND	ND	NA	DRY

Table 5
Summary of Key Contaminants of Concern
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

TPHg (mg/L)

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	0.03[h]	NA	NA	NA	NA
11669-MW-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04[h]	ND	ND	ND	ND
11669-MW-3	0.0379	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	0.03[h]	NA	NA	NA	NA
11669-MW-4	ND	0.212	0.104	0.021	0.4	0.64	0.42	0.44	0.59	0.66	0.07[h]	0.62	0.27	0.26	0.049	0.23
11669-MW-5	12.1	8.06	5.29	5.37	5.1	7.5	3.4	2.6	1.2	1.2	1.32	0.95	0.55	0.42	0.43	0.45
11669-MW-6	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	0.03[h]	ND	ND	ND	ND
11669-MW-7	0.0282	ND	NA	ND	ND	ND	ND	ND	ND	NA	ND	0.03[h]	ND	ND	NA	ND
11669-MW-8	ND	0.0231	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03[h]	ND	ND	NA	ND
Area1-SP-1	NA	NA	NA	NA	NA	ND	NA	ND	DRY	ND	DRY	0.03[h]	ND	ND	NA	DRY
Area1-SP-2	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	DRY	0.03[h]	ND	ND	NA	DRY

TPHd (mg/L)

	Oct-98	Feb-99	Jun-99	Sept-99	Sum-00	Win-01	Sum-01	Win-02	Sum-02	Win-03	Sum-03	Win-04	Sum-04	Win-05	Sum-05	Win-06
20-MW-1	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11669-MW-2	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	0.098
11669-MW-3	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11669-MW-4	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11669-MW-5	ND	ND	0.94	1.4	NA	NA	NA	NA	NA	NA	NA	0.26	ND	ND	0.11	0.13
11669-MW-6	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
11669-MW-7	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11669-MW-8	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Area1-SP-1	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	DRY
Area1-SP-2	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	DRY

Table 5
Summary of Key Contaminants of Concern
IRP Site 20, Area 1 (UST Area)
Vandenberg AFB, California

Definition(s):

DCA - dichloroethane
DCP - dichloropropane
DRY - well was dry or had insufficient water for sampling
EDB - 1,2-dibromoethane (ethylene dibromide)
MCL - maximum contaminant level
µg/L - micrograms per liter
mg/L - milligrams per liter
NA - not analyzed
ND - Not detected; result is less than the MDL.
TPHd - total petroleum hydrocarbons as diesel
TPHg - total petroleum hydrocarbons as gasoline

Note(s):

Bold type indicates results that were above the MCL.

a - The MCL for benzene is 1 µg/L.
b - The MCL for toluene is 150 µg/L.
c - The MCL for ethylbenzene is 300 µg/L.
d - The MCL for EDB is 0.05 µg/L.
e - The MCL for the sum of m-xylene, o-xylene, and p-xylene is 1,750 µg/L.
f - The MCL for 1,2-DCP is 5 µg/L.
g - The MCL for 1,2-DCA is 0.5 µg/L.
h - The data were qualified for blank contamination during the validation process. The laboratory method blank result showed the same order of magnitude as the sample result, which is considered not to have originated from the environmental sample, due to possible cross-contamination. The result is strongly suspected to be false positive.

APPENDIX A PURGE RECORDS

TETRA TECH, INC.
4213 State Street, STE 100
Santa Barbara, CA 93110
Telephone (805) 681-3100
Telefax (805) 681-3108

GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

DATE 2/7/06 SITE NUMBER 20 A1 PURGING DEVICE MICROPURGE DEDICATED PUMP

PROGRAM NAME BGMP TRIP BLANK I.D. V20TB1174 SAMPLING DEVICE MICROPURGE DEDICATED PUMP

MONITORING WELL IDENTIFICATION 11669-MW-2 PID READING IN CASING (ppm) (initial) 3.8 (vented to) 2.0

SAMPLE I.D. V11669MW2 DUPLICATE I.D. / COLLECTION TIME — / — PID READING IN BREATHING ZONE (ppm) (initial) 2.0 (vented to) 2.0

STATIC WATER LEVEL (ft btoc) 24.13 TOTAL WELL DEPTH (ft btoc) 42.7

WATER COLUMN (feet) 18.6 TUBING DIAMETER (in) 1/4 SAMPLER'S SIGNATURE Mark M. Hash

PUMP & TUBING (V) (L) 0.25 5 V (L) 1.25

Time	Activity	Water Level (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (L)	Pump & Tubing Volumes Purged	Flow Rate (LPM)
1030	Arrived at well	—	—	—	—	—	—	—	—	—	—	—
1038	Begin Purge	—	—	—	—	—	—	—	—	—	—	0.20
1040		24.29	16.50	1877	5.37	7.91	4.74	152.9	Clear	0.40	1.60	↓
1042		24.30	16.22	1743	5.35	3.88	2.98	154.9	Clear	0.80	3.20	
1044		24.34	16.00	1680	5.32	1.69	2.24	156.7	Clear	1.20	4.80	
1046		24.37	16.06	1675	5.32	0.37	2.06	157.2	Clear	1.60	6.40	↓
1047	End Purge											
1050	Sample											
1110	Vacated well	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 24.39 FILTER LOT # —

Comments: ADD: 25.29' btoc

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ±1 C (1.8 F)	Conductivity ± 5%
pH ± 0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.

TETRA TECH, INC.
4213 State Street, STE 100
Santa Barbara, CA 93110
Telephone (805) 681-3100
Telefax (805) 681-3108

GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

DATE 7 FEB 2006 SITE NUMBER 20A1 PURGING DEVICE 2" SUBMERSIBLE GRUNDFOS PUMP

PROGRAM NAME BGMP TRIP BLANK I.D. V20TB1173 SAMPLING DEVICE DISPOSABLE TEFLON BAILER

MONITORING WELL IDENTIFICATION 1169-MW-4 PID READING IN CASING (ppm) (initial) 0.6 (vented to) 0.0

SAMPLE I.D. V1169MW4 DUPLICATE I.D. / COLLECTION TIME -/- PID READING IN BREATHING ZONE (ppm) (initial) 0.0 (vented to) 0.0

STATIC WATER LEVEL (ft btoc) 35.88 TOTAL WELL DEPTH (ft btoc) 47.4

WATER COLUMN (feet) 11.52 CASING DIAMETER (in) 4 SAMPLER'S SIGNATURE

WELL VOLUME (V) (gals) 7.5 3 V (gals) 22.5 BAILER BOX # 201

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1125	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1135	Begin Purge	—	46	—	—	—	—	—	—	—	—	—	1.0
1140	|	39.40	|	18.07	6944	5.91	9.34	1.37	60.8	slightly cloudy	5	0.67	|
1145	|	41.59	|	18.25	4871	5.78	7.53	1.66	68.7	clear	10	1.3	|
1150	|	43.46	|	18.49	7181	5.56	5.10	1.05	75.5	clear	15	2.0	|
1155	|	45.33	|	18.62	8230	5.57	3.44	0.97	52.4	clear	20	2.7	V
1159	END PURGE - WELL DRY												
1215	Sample	—	—	18.17	6820	6.25	11.0	4.82	5.5	—	—	—	—
1230	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 42.15 FILTER LOT # —

Comments:

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ±1 C (1.8 F)	Conductivity ±5%
pH ±0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.

Form number Tt-O-050 (9/05)

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4213 State Street, STE 100
Santa Barbara, CA 93110
Telephone (805) 681-3100
Telefax (805) 681-3108

GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

DATE 7 FEB 2006 SITE NUMBER 20A1 PURGING DEVICE BAILER ~~2" SUBMERSIBLE GRUNDFOS PUMP~~

PROGRAM NAME BGMP TRIP BLANK I.D. V20TB1173 SAMPLING DEVICE DISPOSABLE TEFLON BAILER

MONITORING WELL IDENTIFICATION 11669-MW-5 PID READING IN CASING (ppm) (initial) 0.0 (vented to) 0.0

SAMPLE I.D. V11669MW5 DUPLICATE I.D. / COLLECTION TIME V99W606 / 1700 PID READING IN BREATHING ZONE (ppm) (initial) 0.0 (vented to) 0.0

STATIC WATER LEVEL (ft btoc) 29.50 TOTAL WELL DEPTH (ft btoc) 33.2

WATER COLUMN (feet) 3.5 CASING DIAMETER (in) 4 SAMPLER'S SIGNATURE

WELL VOLUME (V) (gals) 2.3 (9.2L) 3 V (gals) 6.8 (27.6L) BAILER BOX # 201

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (~~gals~~ L)	Well Volumes Purged	Flow Rate (GPM)
1235	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1239	Begin Purge	—	—	—	—	—	—	—	—	—	—	—	—
1243	|	—	—	17.57	3814	6.08	9.58	3.05	-58.9	clear	4	0.43	—
1251	|	31.91	—	16.51	3490	6.05	4.43	3.45	-69.9	clear	8	0.87	—
1257	|	31.22	—	16.38	3448	6.02	7.49	3.46	-74.2	clear	12	1.3	—
1302	|	31.75	—	16.47	3343	6.03	7.42	3.15	-72.2	clear	16	1.7	—
1307	|	32.0	—	16.37	3152	6.06	5.64	4.66	-74.8	clear	20	2.2	—
1316	|	32.22	—	16.34	3062	6.12	6.06	~~6.02~~ 4.33	-70.9	clear	24	2.3	—
1320	SAMPLE	•											•
1415	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 32.22 FILTER LOT # —

PARAMETERS FOR WATER QUALITY STABILIZATION
Temperature ±1 C (1.8 F) Conductivity ±5%
pH ±0.1 Turbidity 5 NTUs

Comments: Sulfur smell
NO READINGS TAKEN AT TIME OF SAMPLE DUE TO INSUFFICEINT WATER COLUMN.

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.

Form number Tt-O-050 (9/05)

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Telephone (805) 681-3100
Telefax (805) 681-3108

GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

DATE 2/6/06 SITE NUMBER 20A1 PURGING DEVICE 2" SUBMERSIBLE GRUNDFOS PUMP

PROGRAM NAME BGMP TRIP BLANK I.D. V20TB1172 SAMPLING DEVICE DISPOSABLE TEFLON BAILER

MONITORING WELL IDENTIFICATION 11669-MW-6 PID READING IN CASING (ppm) (initial) 0.0 (vented to) 0.0

SAMPLE I.D. V11669MW6M DUPLICATE I.D. / COLLECTION TIME — PID READING IN BREATHING ZONE (ppm) (initial) 0.0 (vented to) 0.0

STATIC WATER LEVEL (ft btoc) 17.92 TOTAL WELL DEPTH (ft btoc) 30.3

WATER COLUMN (feet) 12.38 CASING DIAMETER (in) 4 SAMPLER'S SIGNATURE

WELL VOLUME (V) (gals) 8.1 3 V (gals) 24.1 BAILER BOX # 201

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1351	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1400	Begin Purge	—	30.0	—	—	—	—	—	—	—	—	—	0.5
1405		19.50	↓	19.16	1590	6.04	15.5	5.50	156.7	clear	2.5	0.31	↓
1410		21.45		17.93	1728	4.74	4.85	4.72	171.6	clear	5.0	0.62	
1415		22.55		17.91	1751	5.65	~~4.67~~ 2.89	4.67	177.7	clear	7.5	0.93	
1420		23.95		17.93	1754	5.61	3.27	4.85	181.2	clear	10.0	1.23	
1425		25.95		17.72	1746	5.57	2.84	4.57	185.6	clear	12.5	1.54	
1430		28.00	↓	17.60	1747	5.52	3.12	4.26	189.2	clear	15.0	1.85	↓
1434	End Purge - Well dry	~~17.50~~				~~4.59~~			~~190.~~				
1445	Sample	27.90	—	17.22	1727	6.11	+200	4.72	196.5	cloudy	—	—	—
1518	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 27.90 FILTER LOT # —

Comments:

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ±1 C (1.8 F)	Conductivity ±5%
pH ±0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.

Form number Tt-O-050 (9/05)

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Santa Barbara, CA 93110
Telephone (805) 681-3100
Telefax (805) 681-3108

GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

DATE 2/6/06 SITE NUMBER 20A1 PURGING DEVICE 2" SUBMERSIBLE GRUNDFOS PUMP

PROGRAM NAME BGMP TRIP BLANK I.D. V20TB1172 SAMPLING DEVICE DISPOSABLE TEFLON BAILER

MONITORING WELL IDENTIFICATION 11669-MW-7 PID READING IN CASING (ppm) (initial) 0.0 (vented to) 0.0

SAMPLE I.D. V11669MW7 DUPLICATE I.D. / COLLECTION TIME — PID READING IN BREATHING ZONE (ppm) (initial) 0.0 (vented to) 0.0

STATIC WATER LEVEL (ft btoc) 23.00 TOTAL WELL DEPTH (ft btoc) 32.5

WATER COLUMN (feet) 9.5 CASING DIAMETER (in) 4 SAMPLER'S SIGNATURE

WELL VOLUME (V) (gals) 6.18 2 3 V (gals) 18.5 BAILER BOX # 201

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1520	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1523	Begin Purge	—	33.0	—	—	—	—	—	—	—	—	—	0.5
1528		24.65	↓	19.07	1623	6.43	+200	6.25	174.7	cloudy	2.5	0.41	↓
1533		26.90		17.29	1998	5.69	186	1.78	171.1	cloudy	5.0	0.81	
1538		28.65		17.27	2071	5.41	+200	2.25	183.2	cloudy	7.5	1.21	
1543		28.67		17.38	2083	5.31	+200	2.19	189.7	cloudy	10.0	1.61	
1545	END PURGE, Well dry	—	—	—	—	—	—	—	—	—	—	—	—
1550	Sample	31.05	—	18.37	1721	6.08	+200	2.79	180.1	cloudy	—	—	—
1610	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 31.05 FILTER LOT # —

Comments: Root matter noted in well @ 29'

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ±1 C (1.8 F)	Conductivity ±5%
pH ±0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.

Form number Tt-O-050 (9/05)

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Telephone (805) 681-3100
Telefax (805) 681-3108

GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

DATE 2/6/06 SITE NUMBER 20A1 PURGING DEVICE 2" SUBMERSIBLE GRUNDFOS PUMP

PROGRAM NAME BGMP TRIP BLANK I.D. V20TB1172 SAMPLING DEVICE DISPOSABLE TEFLON BAILER

MONITORING WELL IDENTIFICATION 11669-MW-8 PID READING IN CASING (ppm) (initial) 0.0 (vented to) 0.0

SAMPLE I.D. V11669MW8 DUPLICATE I.D. / COLLECTION TIME — PID READING IN BREATHING ZONE (ppm) (initial) 0.0 (vented to) 0.0

STATIC WATER LEVEL (ft btoc) 16.29 TOTAL WELL DEPTH (ft btoc) 30.0

WATER COLUMN (feet) 13.7 CASING DIAMETER (in) 4 SAMPLER'S SIGNATURE M. Mfm

WELL VOLUME (V) (gals) 8.9 3 V (gals) 26.7 BAILER BOX # 201

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1220	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1233	Begin Purge	—	30.0	—	—	—	—	—	—	—	—	—	0.5
1238		18.70	30.0	19.23	1809	6.45	6.52	4.95	68.8	clear	~~2.5~~ 5.0	0.28	0.5
1243		20.55	30.0	17.83	1803	6.04	3.10	3.65	91.5	clear	~~2.5~~ 5.0	0.56	0.5
1248		22.10	30.0	17.97	1807	5.81	4.52	3.50	117.1	clear	7.5	0.84	0.5
1253		23.20	30.0	18.25	1818	5.71	5.36	8.15	133.3	clear	10.0	1.12	0.5
1258		24.04	30.0	18.53	1880	5.65	6.09	2.97	142.7	clear	12.5	1.40	0.5
1303		25.67	30.0	18.78	1816	5.61	6.39	2.82	151.3	clear	15.0	1.69	0.5
1308		27.72	30.0	18.22	1780	5.52	7.95	2.38	163.2	clear	17.5	1.97	0.5
1313		29.19	30.0	18.06	1641	5.45	—	—	148.7	clear	20.0	2.25	0.5
1314	End Purge, Well Dry												
1324	Sample	27.80	—	17.82	1812	3.64	—	3.64	156.2	cloudy	—	—	—
1350	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 27.80 FILTER LOT # —

Comments: Last readings for Turb & DO not taken since well went dry
Organic matter noted in bailer

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ±1 C (1.8 F)	Conductivity ±5%
pH ±0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.

Form number Tt-O-050 (9/05)

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4213 State Street, STE 100
Santa Barbara, CA 93110
Telephone (805) 681-3100
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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

DATE 2/7/06 SITE NUMBER 20 A1 PURGING DEVICE —

PROGRAM NAME BGMP TRIP BLANK I.D. — SAMPLING DEVICE —

~~MONITORING WELL~~ SMP IDENTIFICATION Area1 - SP-1 PID READING IN CASING (ppm) (initial) — (vented to) —

SAMPLE I.D. — DUPLICATE I.D. / COLLECTION TIME — / — PID READING IN BREATHING ZONE (ppm) (initial) — (vented to) —

STATIC WATER LEVEL (ft btoc) — TOTAL WELL DEPTH (ft btoc) —

WATER COLUMN (feet) — CASING DIAMETER (in) — SAMPLER'S SIGNATURE Mark M. Hall

WELL VOLUME (V) (gals) — 3 V (gals) — BAILER BOX # —

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1330	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
—	Insufficient seepage present for sample collection. Moist soil noted at seep location. No												—
	Sample collected.												
1335	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: — FILTER LOT # —

Comments: —

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ±1 C (1.8 F)	Conductivity ± 5%
pH ±0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.

Form number Tt-O-042 (9/05)

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4213 State Street, STE 100
Santa Barbara, CA 93110
Telephone (805) 681-3100
Telefax (805) 681-3108

GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

DATE 2/7/06 SITE NUMBER 30 A1 PURGING DEVICE —

PROGRAM NAME BGMP TRIP BLANK I.D. — SAMPLING DEVICE —

~~MONITORING WELL~~ Seep IDENTIFICATION Area 1 - SP- 2 PID READING IN CASING (ppm) (initial) — (vented to) —

SAMPLE I.D. — DUPLICATE I.D. / COLLECTION TIME — / — PID READING IN BREATHING ZONE (ppm) (initial) — (vented to) —

STATIC WATER LEVEL (ft btoc) — TOTAL WELL DEPTH (ft btoc) —

WATER COLUMN (feet) — CASING DIAMETER (in) — SAMPLER'S SIGNATURE Mark M. Aleksak

WELL VOLUME (V) (gals) — 3 V (gals) — BAILER BOX # —

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1340	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
—	Insufficient seepage present for sample collection. Moist soil noted at seep location. No sample												
—	collected.												
1345	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: — FILTER LOT # —

Comments:

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ±1 C (1.8 F)	Conductivity ±5%
pH ±0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.

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APPENDIX B CHAIN-OF-CUSTODY RECORDS

4213 State Street, Suite 100
Santa Barbara, CA 93110
Phone (805) 681-3100
FAX (805) 681-3108

SHIPPED TO: EMAX Labs
1835 West 205th Street
Torrance, CA 90501

OGB048

CHAIN OF CUSTODY RECORD

SITE 20A1 DATE 2/6/06 PAGE 1 OF 1

CLIENT	Vandenberg, AFB
PROJECT NAME	BGMP
PROJECT MANAGER	Kevin McNamara
TC#	T99105-06
SAMPLERS (Signatures)	X [signature]
	X [signature]

ANALYTICAL METHODS

SAMPLE NO.	DATE	TIME	SW8260 Volatile Organics	SW8015 ~~Diesel~~ / Gasoline	SW8081 Pesticides	SW8082 PCBs	SW8270 SVOCs	SW8270 SIM PAHs	SW6010 (7470) ~~7471~~ Metals	E218.6 Chromium VI	E300/310.1/160.1 CL/S/ALK/TDS	E353.3/E415.1 N / TOC	RSK 175	E376.2 Sulfide	E314.0 Perchlorate	SW8015 Diesel	Matrix Type	Container Type	Number of Containers	Filtered Sample
1 V20TB1172	2/6/06	0805	X														W	G	2	
2 V11669MW6M		1445	X	X												X	W	G	22	
3 V11669MW7		1550	X	X													W	G	6	
4 V11669MW8		1324	X	X													W	G	6	
5 V99BEB201		0945	X	X			X	X	X							X	W	G/P	11	

OBSERVATIONS/COMMENTS: MS / MSD

TURN-AROUND TIME: Standard

MATRIX TYPE: S = Soil, W = Water, SD = Sediment
CONTAINER TYPE: E = Encore; G = Glass, SS = Stainless Steel, P = Plastic
PRESERVATIVES: All samples are preserved at 4° C. Water samples are preserved as indicated on the sample labels.
TEMPERATURE BLANK EACH COOLER: (YES) NO

RELINQUISHED BY: [signature]	SIGNATURE: [signature]	TETRA TECH, INC.	DATE: 2/7/06	TIME: 1100	TOTAL NUMBER OF CONTAINERS: 47
RECEIVED BY: ALFREDO GALICIA	SIGNATURE: [signature]	COMPANY: EMAX	DATE: 2/7/06	TIME: 11:00	METHOD OF SHIPMENT
RELINQUISHED BY: ALFREDO GALICIA	SIGNATURE: [signature]	COMPANY: EMAX	DATE: 2/7/06	TIME: 13:13	SPECIAL SHIPMENT/HANDLING/STORAGE REQUIREMENTS:
RECEIVED BY: ~~KNARY~~ FUENTES	SIGNATURE: [signature]	COMPANY: EMAX	DATE: 2/7/06	TIME: 13:13	

① T= 2.9°C

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DISTRIBUTION: White = Lab Canary = Client Pink = Tetra Tech, Inc.

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Santa Barbara, CA 93110
Phone (805) 681-3100
FAX (805) 681-3108

SHIPPED TO: EMAX Labs
1835 West 205th Street
Torrance, CA 90501

06B062

CHAIN OF CUSTODY RECORD

28/VW01-36

SITE 20A1 DATE 2/7/06 PAGE 1 OF 1

CLIENT	Vandenberg, AFB
PROJECT NAME	BGMP
PROJECT MANAGER	Kevin McNamara
TC#	T99105-06
SAMPLERS (Signatures)	
X	
X	Matt M. Peterson

ANALYTICAL METHODS

SAMPLE NO.	DATE	TIME	SW8260 Volatile Organics	SW8015 Diesel / ~~Gasoline~~	SW8081 Pesticides	SW8082 PCBs	SW8270 SVOCs	SW8270 SIM PAHs	SW6010 / 7470 / 7471 Metals	E218.6 Chromium VI	E300/310.1/160.1 CL/S/ALK/TDS	E353.3/E415.1 N / TOC	RSK 175	E376.2 Sulfide	E314.0 Perchlorate	SW8015 GAS	Matrix Type	Container Type	Number of Containers	Filtered Sample
1 V11669MW2	2/7/06	1050	X	X												X	W	g	8	
2 V20TB1173		0800	X														W	g	2	
3 V99W606		1700	X	X												X	W	g	8	
4 V11669MW5		1320	X	X												X	W	g	8	
5 V11669MW4		1215	X													X	W	g	6	

TURN-AROUND TIME: Standard

OBSERVATIONS/COMMENTS:

MATRIX TYPE: S = Soil, W = Water, SD = Sediment
CONTAINER TYPE: E = Encore; G = Glass, SS = Stainless Steel, P = Plastic
PRESERVATIVES: All samples are preserved at 4° C. Water samples are preserved as indicated on the sample labels.
T=3.7°C, T=4.0°C TEMPERATURE BLANK EACH COOLER: (YES) NO

RELINQUISHED BY:	SIGNATURE:	COMPANY:	DATE:	TIME:
Matt Peterson		TETRA TECH, INC.	2/8/06	1100
RECEIVED BY: ALFRED GALICIA	SIGNATURE:	COMPANY: EMAX	DATE: 2/8/06	TIME: 11:00
RELINQUISHED BY: ALFRED GALICIA	SIGNATURE:	COMPANY: EMAX	DATE: 2/8/06	TIME: 15:10
RECEIVED BY: JON LUNA	SIGNATURE:	COMPANY: emax	DATE: 2/8/06	TIME: 1510

TOTAL NUMBER OF CONTAINERS: 32
METHOD OF SHIPMENT: Courier
SPECIAL SHIPMENT/HANDLING/STORAGE REQUIREMENTS:

1001

DISTRIBUTION: White = Lab Canary = Client Pink = Tetra Tech, Inc.